WHAT IS CLAIMED IS:

1. A nanomechanical device comprising:

a power device comprising at least one of a power emitter and a power detector;

a substrate;

and at least one self-assembled nanobimorph in signal communication with the power device wherein each nanobimorph comprises at least two adjacent nanofeatures having proximal and distal ends, wherein the proximal ends of the nanofeatures are spaced apart and fixedly attached to the substrate and wherein the distal ends of the nanofeatures are attractively coupled such that a potential applied to the nanobimorph by the power device induces lateral motion in the nanobimorph and such that motion of the nanobimorph induces a voltage or current measurable by the power device.

2. The nanomechanical device according to claim 1 wherein the substrate is made of a material selected from the group consisting of silicon, alumina, glass or plastic.

3. The nanomechanical device according to claim 2 wherein the substrate further comprises a plurality of electrodes sufficient such that each of the nanofeatures is fixedly attached to the substrate through a separate electrode, wherein the electrodes are in signal communication with the power device and wherein the nanobimorphs are in signal communication with the power device through the electrodes.

4. The nanomechanical device according to claim 1 wherein the electrodes are made of a metal selected from the group consisting of gold, platinum and titanium.

5. The nanomechanical device according to claim 3 wherein multiple nanofeatures are attached to each electrode.

6. The nanomechanical device according to claim 1 wherein the substrate further comprises a plurality of catalytic spots deposited thereon wherein each of the nanofeatures is fixedly attached to the substrate through a separate catalytic spot.

7. The nanomechanical device according to claim 6 wherein the catalytic material is selected from the group consisting of Fe, Ti, Ni, Co, Ni/Co alloy, and Ni/Ti alloy.

8. The nanomechanical device according to claim 1 wherein the power device is a power source selected from the group consisting of: a light source, a voltage source, a current source, and a magnetomotive source.

9. The nanomechanical device according to claim 1 wherein the power device is a voltage detector.

10. The nanomechanical device according to claim 1 wherein the nanofeatures have a cross-sectional dimension of about 1 to 100 nm.

11. The nanomechanical device according to claim 1 wherein the space between the nanofeatures of a single bimorph has dimensions of about 10 to 200 nm.

12. The nanomechanical device according to claim 1 wherein the device operates as one of an actuator, an oscillator and a sensor.

13. The nanomechanical device according to claim 1 wherein the device is an actuator selected from the group consisting of: a probe, a nanotweezer, a molecular assembly device, a switch, and a mechanical transistor.

14. The nanomechanical device according to claim 1 wherein the device is an oscillator selected from the group consisting of: a filter, a signal processor, and a micro-gyroscope.

15. The nanomechanical device according to claim 1 wherein the device is a force-based sensor.

16. The nanomechanical device according to claim 1 wherein the comprises a plurality of nanobimorphs arranged on the substrate in a uniform periodic array having a uniform lattice spacing between nanobimorphs.

17. The nanomechanical device according to claim 1 wherein the nanofeatures are made of carbon.

18. The nanomechanical device according to claim 1 wherein the nanofeatures are grown by self-assembly on the substrate.

19. The nanomechanical device according to claim 1 wherein the nanofeatures are one of either nanotubes or nanorods.

20. The nanomechanical device according to claim 1 wherein the nanofeatures are chemically or biologically functionalized.

21. The nanomechanical device according to claim 1 wherein the outer surface of the nanofeatures are treated to increase the resistance of the nanofeatures.

22. The nanomechanical device according to claim 1, further comprising a device body defining an internal volume wherein the nanobimorph is confined within the internal volume.

23. The nanomechanical device according to claim 22, wherein one of the substrate or device body is transparent.

24. The nanomechanical device according to claim 22 wherein the device body is made of a material selected from the group consisting of silicon, alumina, glass and plastic.

25. The nanomechanical device according to claim 1 wherein the potential induced motion of the nanobimorph is proportional to the potential applied to the nanobimorph.

26. The nanomechanical device according to claim 1 wherein the motion induced potential of the nanobimorph is proportional to the degree of motion of the nanobimorph.

27. The nanomechanical device according to claim 1 wherein the device is disposed in a liquid environment.

28. The nanomechanical device according to claim 1 wherein the device is disposed in a vacuum environment.

29. The nanomechanical device according to claim 1 wherein the device is disposed in a gaseous environment.

30. The nanomechanical device according to claim 1 comprising at least two nanobimorphs wherein at least one of the nanobimorphs is operated as a sensor and at least one of the nanobimorphs is operated as an actuator.

31. The nanomechanical device according to claim 1 comprising at least two nanobimorphs wherein the nanobimorphs are operated as sensors, wherein each sensor is designed to detect a different substance.

32. The nanomechanical device according to claim 1 comprising at least two nanobimorphs wherein the nanobimorphs are operated as sensors, wherein all the sensors are designed to detect a single substance.

33. The nanomechanical device according to claim 1 comprising at least two nanobimorphs wherein the nanobimorphs are operated as actuators to provide motion in multiple dimensions.

34. The nanomechanical device according to claim 1 wherein the substrate further comprises a depressed portion and where the nanobimorph is formed over the depressed portion in the plane defined by the substrate.

35. The nanomechanical device according to claim 1 wherein the substrate has an area of about 1 mm^2 to 1 cm^2.

36. A nanomechanical actuator comprising:

a power emitter;

a substrate;

and at least one self-assembled nanobimorph in signal communication with the power emitter wherein each nanobimorph comprises at least two adjacent nanofeatures having proximal and distal ends, wherein the proximal ends of the nanofeatures are spaced apart and fixedly attached to the substrate and wherein the distal ends of the nanofeatures are attractively coupled such that power applied to the nanobimorph by the power emitter induces lateral motion in the nanobimorph.

37. A nanomechanical device comprising:

a power detector;

a substrate;

and at least one self-assembled nanobimorph in signal communication with the power detector wherein each nanobimorph

comprises at least two adjacent nanofeatures having proximal and distal ends, wherein the proximal ends of the nanofeatures are spaced apart and fixedly attached to the substrate and wherein the distal ends of the nanofeatures are attractively coupled such that motion of the nanobimorph induces a voltage or current measurable by the power detector.

38. A method of forming a nanomechanical device comprising:

providing a substrate;

depositing at least two adjacent catalytic spots onto the substrate;

placing the substrate into an atmosphere of nanofeature feedstock at a specified growth temperature for a time sufficient to allow for the growth of at least two adjacent nanofeatures on the catalytic spots to a sufficient length such that the unattached ends of the adjacent nanofeatures are attractively coupled together to form a nanobimorph.

39. The method according to claim 38 wherein the substrate is made of a material selected from the group consisting of silicon, alumina, glass or plastic.

40. The method according to claim 38 further comprising depositing electrodes onto the substrate at each of the catalytic spots, wherein the electrodes are in signal communication with a power device and wherein the nanobimorphs are in signal communication with the power device through the electrodes.

41. The method according to claim 40 wherein the electrodes are made of a metal selected from the group consisting of gold, platinum and titanium.

42. The method according to claim 40 wherein multiple nanofeatures are attached to each electrode.

43. The method according to claim 38 wherein the catalytic material is selected from the group consisting of Fe, Ti, Ni, Co, Ni/Co alloy, and Ni/Ti alloy.

44. The method according to claim 40 wherein the power device is a power source selected from the group consisting of: a light source, an voltage source, a current source, and a magnetomotive source.

45. The method according to claim 40 wherein the power device is a voltage detector.

46. The method according to claim 38 wherein the nanofeatures have a cross-sectional dimension of about 1 to 100 nm.

47. The method according to claim 38 wherein the space between the nanofeatures of a single bimorph has dimensions of about 10 to 200 nm.

48. The method according to claim 38 wherein a plurality of nanobimorphs are grown and arranged on the substrate in a

uniform periodic array having a uniform lattice spacing between nanobimorphs.

49. The method according to claim 38 wherein the catalyst spots are deposited by one of either an electron beam or sputter deposition method.

50. The method according to claim 38 wherein the nanofeatures are grown by self-assembly on the substrate.

51. The method according to claim 38 wherein the nanofeatures are nanotubes.

52. The method according to claim 38 wherein the feedstock consists at least partially of a carbon-based gas.

53. The method according to claim 38 wherein the feedstock consists at least partially of ethylene.

54. The method according to claim 38 wherein the growth temperature is at least 400 °C.

55. The method according to claim 38 wherein the growth temperature is between about 500 and 650°C.

56. The method according to claim 38 wherein the substrate is a processed CMOS circuit.

57. The method according to claim 38 wherein the nanofeatures are chemically or biologically functionalized.

58. The method according to claim 38 wherein the outer surface of the nanofeatures are treated to increase the resistance of the nanofeatures.

59. The method according to claim 38 wherein the substrate has an area of about 1 mm^2 to 1 cm^2.

60. The method according to claim 38 wherein the growth step is conducted in a low pressure atmosphere of the feedstock.

61. The method according to claim 60 wherein the pressure of the feedstock is about 5 Torr.

62. The method according to claim 38 wherein the feedstock comprises ethylene diluted in at least one of the gases selected from the group consisting of: nitrogen, ammonia and hydrogen.

63. The method according to claim 38 where growth step conducted in the presence of a plasma.

64. A method of detecting a molecule in a sample comprising the steps of:

providing a nanomechanical device comprising a power detector, a substrate, and at least one self-assembled nanobimorph in signal communication with the power detector wherein each nanobimorph comprises two adjacent nanofeatures having proximal and distal ends, wherein the proximal ends of the nanofeatures are spaced apart and fixedly attached to the

substrate and wherein the distal ends of the nanofeatures are attractively coupled such that motion of the nanobimorph induces a potential measurable by the power detector;

introducing the sample into proximity of the nanomechanical device;

measuring the potential on the bimorph and communicating the potential to a user.

65. The method according to claim 64 wherein the potential is proportional to the motion of the nanobimorph.

66. The method according to claim 64 wherein the nanofeatures are nanotubes.